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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,563	08/31/2001	Masatoshi Narahara	HIRA.0019	7597

7590 04/25/2003

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EXAMINER
GOLDBERG, JEANINE ANNE

ART UNIT	PAPER NUMBER
1634	

DATE MAILED: 04/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/942,563	NARAHARA ET AL.	
	Examiner	Art Unit	
	Jeanine A Goldberg	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This action is in response to the papers filed August 31, 2001. Currently, claims 1-8 are pending.

Priority

2. This application claims priority to foreign filed Japanese application 2001/001761, filed January 9, 2001.

Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119 as follows:

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Should applicant desire to obtain the benefit of foreign priority under 35 U.S.C. 119(a)-(d) prior to declaration of an interference, a translation of the foreign application should be submitted under 37 CFR 1.55 in reply to this action.

Drawings

3. The drawings are approved.

Claim Rejections - 35 USC § 112- Second Paragraph

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A) Claims 1-8 are indefinite over the recitation "functional groups which can have negative charge by dissociating in an aqueous solution" or "functional groups which can have negative charge by hydrolysis" because it is unclear from the claim whether the functional groups have a negative charge or whether the functional groups can have a negative charge. Since the claim is drawn to a product, it is unclear whether the product contain functional groups with negative charges or merely functional groups.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Pal et al (US Pat. 6,528,264, March 4, 2003).

The instant claims are drawn to nucleic acid array products. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not

depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.With respect to Claims 2 and 4, the claim is directed to the array but claims how the array was made. It is noted that Claims 2 and 4, since they are drawn to a product, does not add any additional limitations for how the array was made. In contrast to the instant claims, methods of making an array would be patentably distinct.

Pal teaches a polymer support for DNA immobilization. Pal teaches that polylysine is not very stable on glass substrates and may be blocked with succinic anhydride to confer a negative charge to the polylysine. As shown in Figure 4, a support may be modified in order to form carboxyl group functionalities. Pal teaches that the lysine e-amino groups are reacted with a cyclic anhydride to produce a modified polylysine having extended carboxylic acid group functionalities (col. 5, lines 35-40). The carboxylic acid groups are then activated to form reactive esters to allow for covalent attachment of ligands. Example 2 is directed to the covalent attachment of DNA through chemical modification (col. 6, lines 65-67). Figure 3 describes a glass slide which was dipped in polylysine/ethanolmine. Then carboxylic acid functionalities were created on the slide with succinic anhydride (col. 7, lines 15-20). The oligonucleotides were printed on the slide in a matrix thereby covalently binding DNA via the carboxyl functional group whereby areas without DNA remain negatively charged (col. 7, lines 27-30). Therefore, Pal teaches a nucleic acid array comprising

single-stranded nucleic acid probes covalently bound to a substrate and carboxyl functional groups with a negative charge. Thus, Pal teaches every limitation of the claimed invention.

6. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Barany et al (US Pat. 6,506,594, January 14, 2003).

The instant claims are drawn to nucleic acid array products. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.With respect to Claims 2 and 4, the claim is directed to the array but claims how the array was made. It is noted that Claims 2 and 4, since they are drawn to a product, does not add any additional limitations for how the array was made. In contrast to the instant claims, methods of making an array would be patentably distinct.

Barany et al. (herein referred to as Barany) teaches detecting nucleic acid sequences on arrays. Barany teaches making arrays which contain oligonucleotide sequences covalently attached to the solid support. Moreover, Barany teaches functionalizing the solid support. Barany teaches that the solid supports can e membrands with a starting function group X (col. 25, lines 15-20). Carboxyl groups are

activated with N, N'-carbonyldiimidazole or water soluble carbodiimides and reacted with an amino functionalized compound (col. 25). Moreover, Barany teaches blocking by acetylation or succinylation to ensure a neutral or negatively charged environment that "repels" excess unhybridized DNA (col. 25, lines 30-40). Barany teaches the derivatization of solid supports with functional groups such as carboxyl or amino groups (col. 46). Example 16 provides for array preparation which creates a lightly crosslinked film of acrylamide/acrylic acid copolymer on a glass support, subsequently, the free carboxyl groups dispersed throughout the polymeric surface are activated and the oligonucleotides are covalently linked (col. 64). Therefore Barany anticipates the claimed invention because Barany teaches every limitation of the instant claims.

7. Claims 1-2, 4, 6-7 are rejected under 35 U.S.C. 102(e) as being anticipated by McGall et al (US2001/0049108 A1, December 6, 2001; filed April 20, 1998).

McGall teaches methods for reducing non-specific binding to an oligonucleotide array. Specifically, McGall teaches a solid support wherein the surface has a plurality of designated regions and a plurality of protected regions (para 8). McGall teaches that non-specific binding of the target molecule to the oligonucleotide array is reduced by the replacement of protecting groups with a negatively charged phosphate residue. McGall teaches that the protected regions are defined as all regions on the surface of the solid support where an oligonucleotide is not intended to be synthesized and which has attached thereto a protecting group (para 32). McGall teaches non-specific binding of the target molecule to the oligonucleotide array is reduced by the replacement of the

protecting groups with a negatively charged phosphate residue (para 9). McGall teaches that the net positive charges at these regions contribute to non-specific binding. McGall teaches the surface of the solid support will contain reactive groups such as carboxyl (para 41). The linker molecules on the monomers are capable of covalent attachment to the reactive sites on the derivatized surface. Additionally, McGall teaches the removal of protecting groups removes the positive charge carried by the protecting groups which contributes to non-specific binding (para 88). McGall teaches modifying the solid support in the protected regions with a negatively charged phosphate residue (para 91).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pal et al (US Pat. 6,528,264, March 4, 2003) or Barany et al (US Pat. 6,506,594, January 14, 2003) in view of Wade, Organic Chemistry, Second Edition (1991), pages 890, 362.

The instant claims are drawn to nucleic acid array products. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) see MPEP 2113.With respect to Claims 2 and 4, the claim is directed to the array but claims how the array was made. It is noted that Claims 2 and 4, since they are drawn to a product, does not add any additional limitations for how the array was made. In contrast to the instant claims, methods of making an array would be patentably distinct.

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Barany et al. (herein referred to as Barany) teaches detecting nucleic acid sequences on arrays. Barany teaches making arrays which contain oligonucleotide sequences covalently attached to the solid support. Moreover, Barany teaches functionalizing the solid support. Barany teaches that the solid supports can e membrands with a starting function group X (col. 25, lines 15-20). Carboxyl groups are activated with N, N'-carbonyldiimidazole or water soluble carbodiimides and reacted with an amino functionalized compound (col. 25). Moreover, Barany teaches blocking by acetylation or succinylation to ensure a neutral or negatively charged environment that "repels" excess unhybridized DNA (col. 25, lines 30-40). Barany teaches the derivatization of solid supports with functional groups such as carboxyl or amino groups (col. 46). Example 16 provides for array preparation which creates a lightly crosslinked film of acrylamide/acrylic acid copolymer on a glass support, subsequently, the free carboxyl groups dispersed throughout the polymeric surface are activated and the oligonucleotides are covalently linked (col. 64).

Neither Pal nor Barany specifically teaches using a functional group that is the product of hydrolysis of maleimide groups. The are teaches hydrolysis converts maleimide to maleamic acid. The courts have stated with regard to chemical homologs that the greater the physical and chemical similarities between the claimed species and any species disclosed in the prior art, the greater the expectation that the claimed subject matter will function in an equivalent manner (see *Dillon*, 99 F.2d at 696, 16 USPQ2d at 1904). As illustrated in Wade, Maleic acid has the chemical formula cis-HOOCCH=CHOOH and succinic acid has the chemical formula of HOOC(CH2)2COOH. It is clear that both of these acids are homofunctional crosslinkers which have a carboxyl group as their functional groups. The two acids merely differ in their carbon chains, namely maleic acid has a single double bond carbon whereas succinic acid is a single bond carbon with two additional hydrogens. The carbon chains are not involved in the reactions of the instant nucleic acid or array. Therefore, maleic and succinic acid are functional equivalents and there is a reasonable expectation that both maleic and succinic would function as equivalents for attaching nucleic acids to solid support.

Conclusion

10. No claims allowable over the art.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A) Bardhan et al. (US 2002/0142339 A1, filed August 30, 2000, in part). Bardhan provides an illustration of a DNA array which comprises negative charges on

the solid support where there is no probe. Moreover, Bardhan teaches coating a slide with GAPS, adding oligonucleotides and treating with succinic anhydride. Succini anhydride confers a net negative charge to the substrate surface and reduces the non-specific binding of target DNA strands, and reduces background signal (para 21-24).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Jeanine Goldberg whose telephone number is (703) 306-5817. The examiner can normally be reached Monday-Friday from 8:00 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Jones, can be reached on (703) 308-1152. The fax number for this Group is (703) 305- 3014.

Any inquiry of a general nature should be directed to the Group receptionist whose telephone number is (703) 308-0196.

Jeanine Goldberg
April 23, 2003

B. J. FORMAN
PATENT EXAMINER